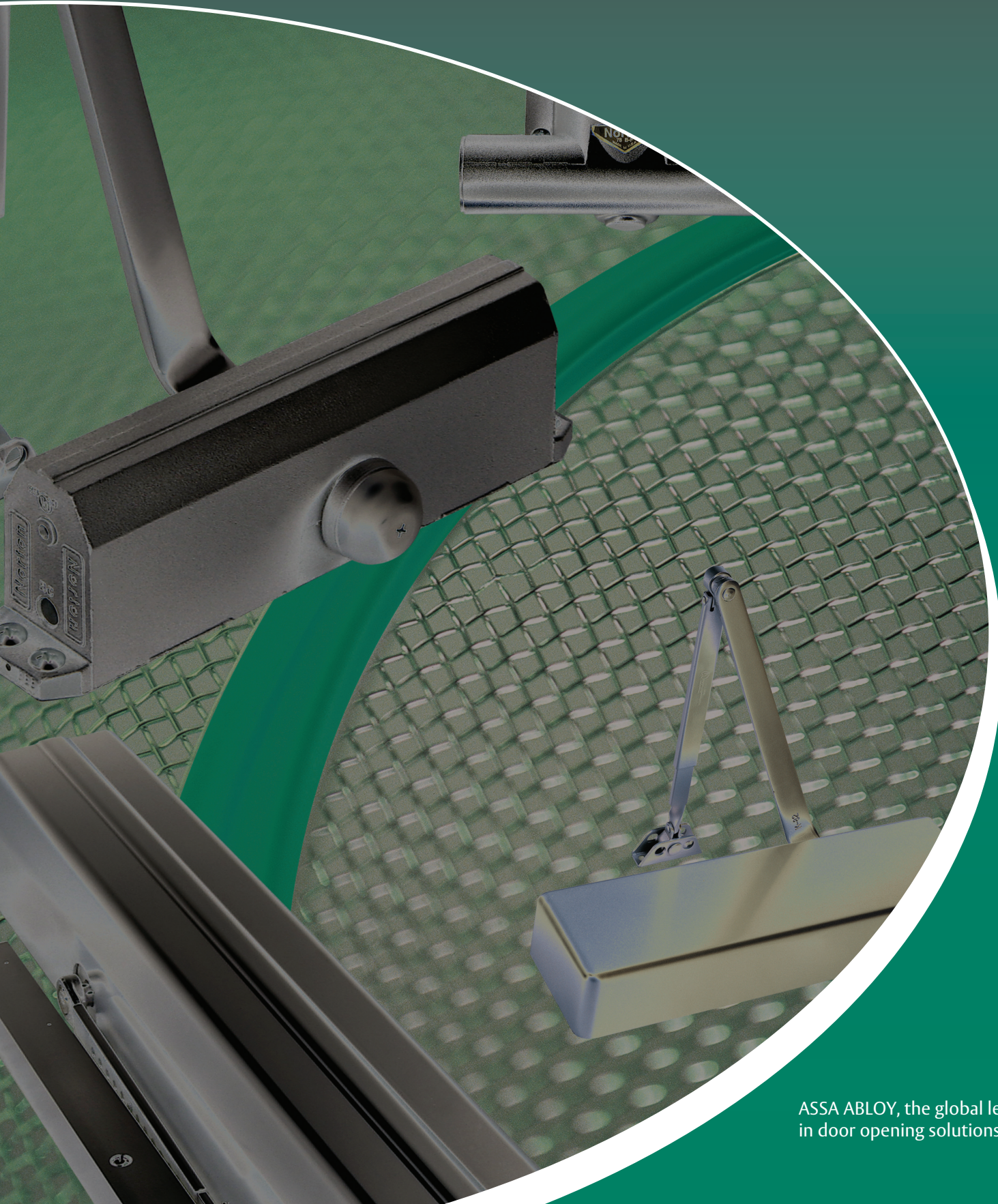




ASSA ABLOY

General Information Guide



ASSA ABLOY, the global leader
in door opening solutions

**GENERAL
INFORMATION**

About Norton Door Controls...

Today's modern Norton® door control began with Lewis C. Norton, the inventor of the first American door closer. In 1880, he organized the Norton Door Check Company to manufacture and market his product: the first practical, commercial door closer. Though cumbersome, his first door closers were effective devices which permitted the adjustment of the door's sweep speed.

In later years, Norton Door Controls refined the rack and pinion closer and the concept of a valve-controlled backcheck for hydraulic closers. Along the way there have been a variety of other innovations, including the aluminum alloy body, narrow style, non-handed closers, adjustable backcheck, speed adjustments and special application arms. As Fire/Life Safety Standards were updated, Norton introduced the 7200 Series Electromechanicals and later the Power Track®. In 1990, the American with Disabilities Act (ADA) was passed, requiring buildings to have handicapped accessible doors for the physically challenged. This law brought about the creation of the original PowerMatic® Low Energy Operator.

Today, Norton Door Controls offers traditional surface, industrial economy, overhead concealed, security, commercial, architectural, electromechanical and electrified closers. To complement the closers, Norton also offers a unique range of arms to help provide maximum door and frame protection. The Norton philosophy has been – and continues to be – one of constant improvement...of quality products.

Since 1957 Norton Door Controls have been manufactured in Monroe, North Carolina.

The ASSA ABLOY Door Security Solutions Sales Force... Specialists in Door Control

Each ASSA ABLOY Sales Representative is selected for his knowledge of hardware and his ability to provide assistance to both specifier and user. His technical background and intimate understanding of *Norton* door closers and their applications are available to the specifier when a project is in the planning stages. When the project is complete he inspects the installation and instructs the maintenance staff on how to adjust each door control.

The ASSA ABLOY Door Security Solutions Representatives are supported by a Technical Product Support Department to help solve field problems. Together, these specialists can overcome most installation difficulties.

Special Templates

All *Norton* door closers and door controls are supplied with instructions that show the correct mounting position for the closer and arm in relation to the door, frame and hinges or offset pivots for a variety of door openings. Templates are available upon request for special conditions, such as center pivoted doors. Whenever you need assistance with a door control application or specification, contact your ASSA ABLOY Door Security Solutions Representative.

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Listings/Approvals

Norton® door closers have been designed and manufactured to conform with government and industry standards. For particulars not covered in this section, please contact your Sales Representative.

Underwriters' Laboratories, Inc.

All Norton door controls are listed by Underwriters' Laboratories, Inc.

State and Local Listings

Norton Series 7200, Series 7700PTO/7700PTDO, Series 7900, Series 7706STP and Series 6900 are listed with the California State Fire Marshal for use on fire doors.

Norton door closers are approved by the New York City Material and Equipment Acceptance Division.

There has been increased emphasis by all parties associated with the construction and operation of buildings to make facilities accessible to and usable by handicapped people. Certain Norton door controls have features or modifications that help achieve these requirements.

To assist you in recognizing these controls, they are called to your attention throughout this catalog by the handicapped symbol.



Federal and Industry Specifications

The following information is provided as a cross-reference. Use it as a guide to door closer design and function only. For additional questions, please contact your Sales Representative.

Norton Series Number	FF-H-121c Federal Spec Type	ANSI Type A156-4
78-B/F	3001-3004-3009	C01000 W/O PT 4A-4C-4D-4F-4H
1600BC 1601	3009 3009	C03000 W/O PT 4A-4D C03000 W/O PT 4A-4B-4C-4D-4F-4H
1700 1700BC	3009 3009	C03000 W/O PT 4A C03000 W/O PT 4A-4D
7500	3001-3004-3009-3230 (MOD)	C02000 W/O PT 4A-4B-4C-4D-4F-4H-4J
7700 7900	C03000	C02000 W/O PT 4A-4B-4C-4D-4F-4J C05030, C05040, C05050, W/O PT 4B-4C-4D-4F-4H
8100	3001-3004-3009	C03000 W/O PT 4A-4B-4C-4D-4F
8300	3001-3004-3009	C02000 W/O PT 4A-4B-4C-4D-4F
8301	3001-3004-3009	C02000 W/O PT 4A-4B-4C-4D-4F-4H
8500 8501	3001-3004-3009-3230 (MOD) 3001-3004-3009-3230 (MOD)	C02000 W/O PT 4A-4B-4C-4D-4F C02000 W/O PT 4A-4B-4C-4D-4F-4H
9300BC	3009	C03000 W/O PT 4A-4D

4A - +15% Power Adjustment
4B - +35% Power Adjustment
4C - +50% Power Adjustment
4D - Adjustable Backcheck

4F - Delayed Action Closing
4G - Factory Set Dead Stop
4H - Adjustable Range of Closing Force
4J - Backcheck Shall Be Advanced 15°

Accessibility Code Closers

Norton Series 1601BF, Series 7500, Series 8301 and Series 8501 have been designed to conform to the requirements outlined in ANSI A117.1

For Buildings and Facilities — Providing Accessibility For Physically Handicapped People.

GENERAL
INFORMATION

Federal and Industry Specifications (continued)

The following information is provided as a cross reference. Use it as a guide to door closer design and function only. For additional questions, please contact your Sales Representative.

Norton® Series Number	ANSI Type A156.15
7700PTO 7700PTDO	CO0191 CO0201
P7700PTO P7700PTDO	CO0231 CO0241

Norton Series Number	ANSI Type A156.15	
	Type Number	Type of Installation
7210MPO 7210MPDO 7210MPSO	C00351 C00361 C00351	Rigid Slide Arm Track
7220/7230MPO 7220/7230MPDO 7220/7230MPSO	C00311 C00321 C00311	Double Lever Arm
7240MPO 7240MPDO 7240MPSO	C00371 C00381 C00371	Connected Free Swing Arm
7250MPO 7250MPDO 7250MPSO	C00391 C00401 C00391	Double Egress Arm
7290MPO	C00651	Overhead Concealed

Glossary of Door and Frame Terms

A number of basic terms are used in the description of doors, frames and the application of door closers to them. Knowledge of these basic terms will provide a better understanding of this catalog.

Door Top Rail: The horizontal rail at the top of the door.

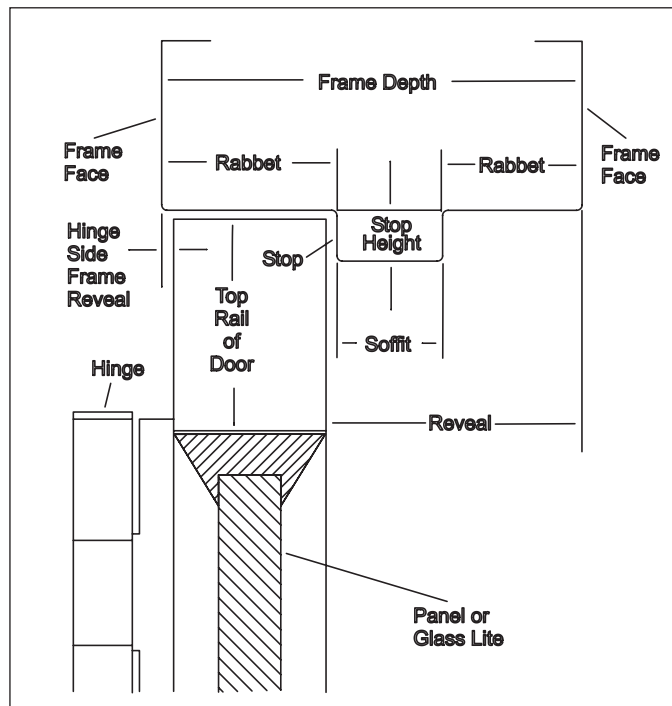
Rabbet: The section of the door frame recessed to receive the door.

Soffit: The flat surface on the underside of the frame between the vertical frame stops.

Stop: The part of the frame against which the door closes.

Frame Face: The exposed part of the frame which is generally parallel to the wall on metal frames. On wood frames this would be the frame molding.

Reveal: The distance from the frame face to the surface of the door.



Applications

Regular Arm: A type of door closer installation. The closer is mounted on the hinge side top rail of the door. The arm is attached to the frame face at a right angle to the door.

Parallel Arm: A type of door closer installation. The closer is mounted on the opposite to hinge side top rail of the door. The arm is attached to the frame soffit parallel to the door.

Top Jamb: A type of door closer installation. The closer is mounted on the opposite to hinge side frame face, above the door. The arm is attached to the top rail of the door at a right angle to the door.

Slide Track Closers: A type of door closer installation. The closer is mounted on either the hinge side or opposite hinge side. The slide track is mounted to frame face on the hinge side, and the frame soffit on the opposite to hinge side.

Corner Bracket Closers: A type of installation when the closer cannot be mounted to either the door or the frame. The bracket is mounted on the upper corner of the push side hinge jamb of the frame. The closer is mounted to the bracket and the arm is attached to the top rail of the door at a right angle to the door.

GLOSSARY OF TERMS

General Terms

Adjustable Backcheck Cushioning: A term used to indicate that the strength of "backcheck cushioning" in the door's opening cycle can be regulated by means of a valve in the closer body.

Adjustable Backcheck Position: A term used to indicate that the location where "backcheck cushioning" occurs in the door's opening cycle can be adjusted by means of a valve in the closer body. This valve provides a range of 20° of door opening where the backcheck can be set.

Adjustable Latch Speed: A term used to indicate that a door's speed can be regulated in the "latch" range of the closing cycle (approximately the last 5° of closing) by means of a valve in the closer body.

Adjustable Sweep Speed: A term used to indicate that a door's speed can be regulated in the "sweep" range of the closing cycle (fully open to 5° from closed) by means of a valve in the closer body.

Adjustable Delayed Action Closing: This special door control feature adds a third speed range to the closing control cycle. It becomes effective when the door is opened and released at any point beyond 70°. This delayed closing enables traffic to clear the opening before the normal closing cycle starts.

Hand (of a door): A term used to describe the direction of a door's swing. When looking at a door — if the hinges are on the right and the door swings away from you, the door is a right hand. If the hinges are on the left and the door swings away from you, the door is a left hand.

Handed: A term used to describe a product that can only be used with either a right hand door or a left hand door, not both.

Non-Handed: Products are said to be non-handed when they can be installed, without modification, on either a right or left hand door.

Field Reversible: Handed products are said to be field reversible when the arrangement of their component parts can be changed to permit their operation on a door of the opposite hand. Often, the labor cost necessary to reverse the hand of a closer makes it desirable to order a closer of the correct hand.

Hold Open: Any means which is employed to maintain a door in an open position.

Friction Hold Open: This type of hold-open consists of two friction surfaces connected by a threaded stud. As the closer arm rotates, the two friction surfaces bind against each other. The amount of friction can be adjusted by means of a nut at the friction point.

Fusible-Link Friction Hold Open: This is a form of friction hold open that employs a fusible link and spring-loaded clamp assembly at the hold open friction joint. The heat from a fire will melt the fusible link, which releases the spring-loaded clamp assembly, relieving pressure on the friction joint and permitting the door closer to close the door. (*Fusible link is not recognized by NFPA therefore Norton does not offer this type arm*).

Mechanical Hold Open: Norton uses two types of mechanical hold open. One is a plunger type, whereby a spring-loaded plunger assembly engages either a ball rivet or a detent in a mating part. The other is a spring-loaded roller catch within a slide track.

Hydraulic Hold Open: This is the type of hold open employed in Norton® electromechanical closer-holders. An electrically controlled plunger assembly seals a chamber within the door closer to permit hydraulic fluid to flow in only one direction. Since the fluid is trapped in this chamber, the closer spring is prevented from closing the door. When power to the unit is interrupted, the plunger valve opens and releases the door from hold open. The door can also be released from hold open by pushing the door toward the closed position with enough force (approximately 15 to 20 lbs.) to overcome the holding force on the plunger valve.

Telephone Booth Door Closer: This special-feature door control holds the door open approximately 5° when the booth is not in use. When the booth is being used, the door can be closed by the user.

Coupon Booth Hold Open: This special-feature door control will hold a door open at approximately 15°. When the door is opened more than 80° the closer will then close and latch the door. This special-feature closer is generally used on safe deposit box inspection cubicles in banks.

Hospital Hold Open: This special-feature door control can hold a door open at any one of three points; approximately 15°, 45° and 90° or beyond. This special-feature closer is generally used where ventilation and privacy are required without having the door fully closed.

Individually Sized Closers: These closers are sized 2, 3, 4, 5 or 6 with each size having a different spring assembly. Each spring assembly provides a minimum closing force that determines its size.

Multi-Size Power Adjustment Closers: These closers have a spring assembly that can be adjusted through a wide power range. Closers with this feature are not individually sized but must be field adjusted through a range of sizes to meet the power needs of the door.

50% Power Adjustment: The closer has an external adjustment that allows preloading of the spring. Depending on the needs of the specific installation, closer power can be increased 50% over the minimum closing force for any size closer.

Adjusta-Power Shoe: This standard non-hold open regular arm or top jamb shoe has three mounting holes. By relocating the closer arm, the closer's power can – in effect – be adjusted 15% (7-1/2% increase or decrease). It provides a simple method of adjusting closer power to meet the need of the specific installation.

Low Profile Arm: A term used to describe an arm which has a minimum space requirement in the vertical distance between the closer pinion and the arm bracket. It requires less mounting space than closers with standard arms.

Non-Critical Valves: These are control valves used to regulate the flow of fluid – in contrast to valves that are either fully open or fully closed. Norton closer control valves have been designed to provide fine tuned hydraulic control.

Parallel Rigid Arm: This is a heavy-duty, non-telescoping forearm used in conjunction with a heavy-duty soffit plate.

Reveal: The distance measured from the surface of the frame face to the surface of the door.

Tri-Style® Packaging: The closer is packed with all necessary hardware for mounting in any of the three traditional mounting styles: Regular Arm, Parallel Arm or Top Jamb. Non-hold open closers have an Adjusta-Power shoe for regular arm and top jamb mounting and a soffit plate for parallel arm mounting. Hold open closers have the hold open arm for regular arm and top jamb mounting and a soffit adapter plate for parallel arm mounting.

GLOSSARY OF TERMS

General Terms...(continued)

Unitrol® Door Control: This is a proprietary Norton® door closer, door holder and shock absorbing door stop combination.

CloserPlus®: This is a combination of a door closer and an arm having a built-in positive stop. A hold open feature which may be engaged or disengaged as necessary is available as an option.

Electromechanical Closer-Holder: This is a door closer equipped with an electromechanical device which permits the door to be held open. When the door is manually pushed toward "closed," the holding mechanism releases and the door closes normally. The holding mechanism can also be released by means of fire/smoke detectors. *Norton* Closer-Holders are available with or without a built-in/integral fire/smoke detector.

Power Track® Closer-Holders: This is a slide track equipped with an electrically operated hold open mechanism. When the door is pushed toward "closed" the hold open mechanism will disengage and allow the door to close. The holding mechanism can be released by either a self-contained fire/smoke detector or by any compatible remote fire/smoke detection system.

Executive™ Door Holder/Releaser: Garage door operator radio frequency technology is applied to the hold open of executive office doors. During normal office business the door is held open. When the executive requires security or privacy he pushes the button on the remote hand-held transmitter. The switch in the receiver operates and interrupts the hold open circuit to allow the door to close.

Positive Stop: A physical limit to the opening of a door. It may be provided by means of floor or wall – mounted stops – usually with resilient bumpers — or by means of a limit imposed by the arm of the door closer. Norton's CloserPlus is an example of the latter.

How a Door Closer Works

The basic function of a door closer is to provide a smooth, controlled closing action to the door after the door has been opened and released. A modern rack and pinion door closer provides this function in the following manner:

As the door is opened, the closer arm transmits motion to the piston in the closer housing smoothly and precisely. This action compresses the spring which provides the energy necessary to close the door.

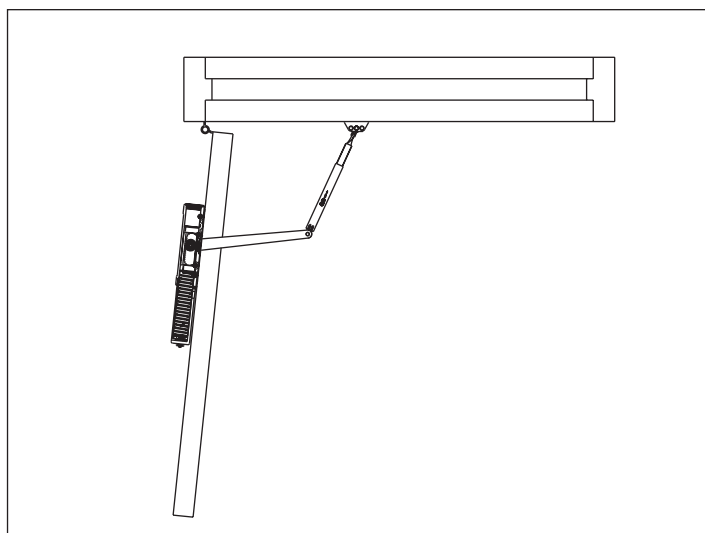
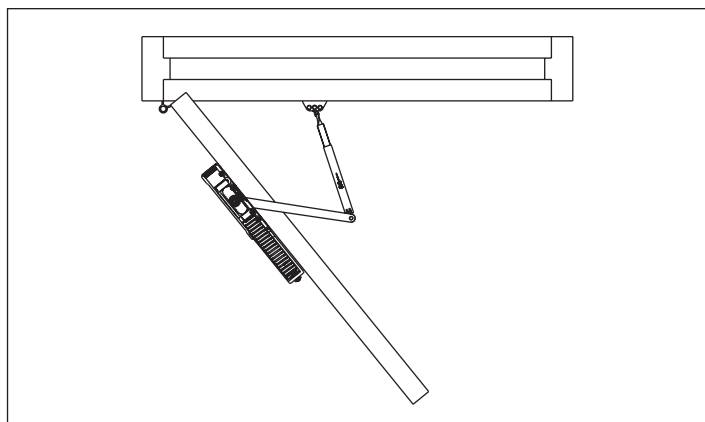
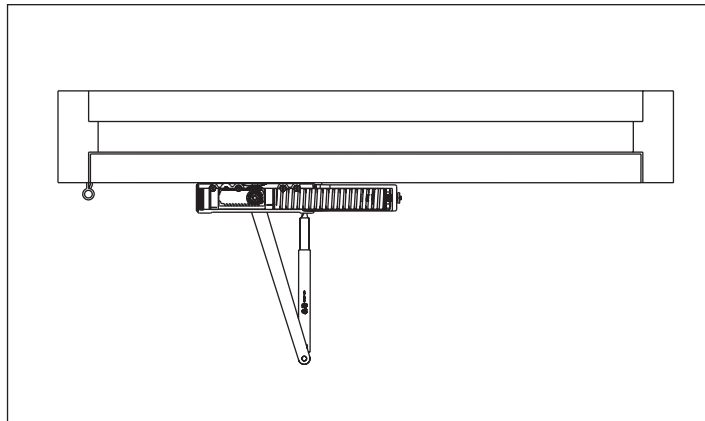
The force generated by the compressed spring is governed by a regulated hydraulic circuit within the closer. This hydraulic circuit provides precise control in the door's closing cycle.

These illustrations simulate generic door closer function. The closer components will vary; however, the principle is the same.

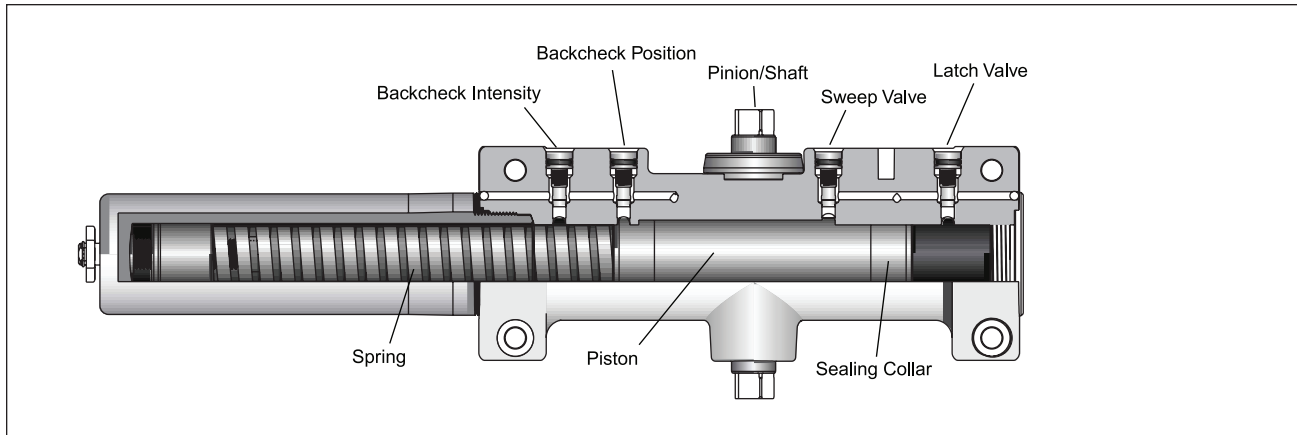
In the door opening cycle, the gear teeth of the pinion/shaft engage with the gear teeth of a rack milled into the piston. As the pinion/shaft rotates, it drives the piston, compressing the spring.

The movement of the piston forces the hydraulic fluid to flow from the reservoir side of the closer, to the area vacated by the piston. The fluid flows back to the reservoir side through a bored passage. Regulating this flow is the basis of controlling the door's closing speed.

During the closing cycle the compressed spring moves the piston toward its original position. This reverses the flow of the hydraulic fluid.



DOOR CONTROLS



In all Norton® door closers, there are two points of control in the hydraulic fluid passage during the closing cycle. One point controls sweep speed; the speed of closing short of the last 5°. The other point controls latch speed; the last 5° of closing. Desirable sweep speed is generally a medium-to-low speed (4 to 6 seconds) closing of the door. Desirable latch speed will vary; a fast speed is desirable for doors with latching hardware; a slower speed is used for doors without latching hardware.

A control valve permits the closing speed to be individually controlled at each passage point. As the piston travels through most of the door's closing, the hydraulic fluid flows through the sweep speed passage.

At a point in the door's closing, the piston's "sealing collar" closes the passage controlling the sweep speed. At this point, the fluid begins to flow through the latch speed passage only.

Surface Mounted Door Closers/Concealed Door Closers

Norton® closers can be surface-mounted or concealed in the frame. Each type has its advantages and disadvantages.

Surface-Mounted Closers

This type of door control is easiest to install, with four drilled and/or tapped holes for the body, and two, four or five holes for the arm bracket. They require a minimum amount of preparation of the door and frame. The surface-mounted closer is also more accessible to the occasional adjustment that may be necessary with changes in usage or environmental conditions. Although surface-mounted closers, by definition, are never truly concealed, most Norton closers can be ordered with covers in a variety of painted or plated finishes to soften the closer's effect on the building design.

Concealed Closers

On the occasions where the architect's design calls for a door closer that is not visually obvious, a concealed closer is recommended. This installation requires considerably more door and frame preparation than a similar surface-mounted closer.

Overhead Concealed Closers

This type of door control is normally mortised into the transom of the frame above the door. A slide track is mortised into the top rail of the door. All elements — closer, arm and slide track — are totally concealed when the door is closed. Norton overhead concealed closers provide sweep and latch speed adjustments, backcheck cushioning and shock absorption. The Series 7900 closers also provide a 50% power adjustment feature. They are available with or without the hold open feature.

Regular Arm, Top Jamb and Parallel Arm

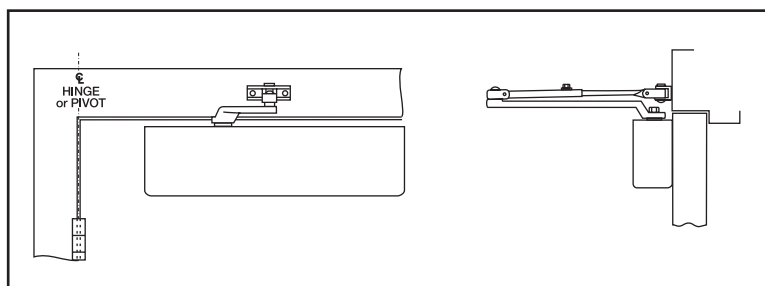
There are three basic methods of mounting surface door closers to the door and frame. The method the architect chooses is influenced by some combination of these five factors:

- Closer position, relative to the locations of door, frame and hinges
- Space limitations on the top rail of the door
- Space limitations on the frame face above the door
- Appearance
- Accessibility of the closer arm (especially in schools)

The three basic mounting methods which follow are illustrated with a double lever arm.

Regular Arm

The closer body is mounted on the top rail, hinge side of the door. The forearm is mounted to the frame face by means of a mounting shoe. The closer body requires less space on the door's top rail than a parallel arm installation. The arm projects from the door at approximately a right angle. Finally, the geometry of the assembly makes a regular arm closer somewhat more power-efficient than a parallel arm closer.

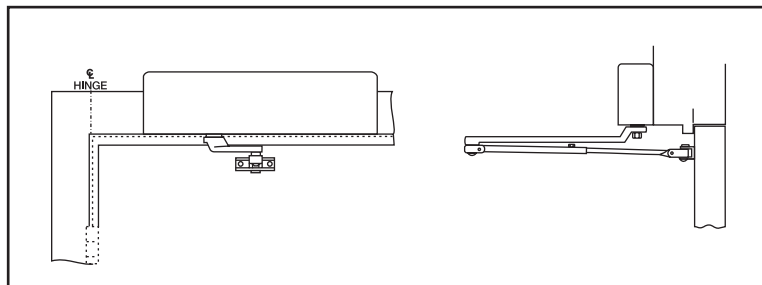


DOOR CONTROLS

Regular Arm, Top Jamb and Parallel Arm (continued...)

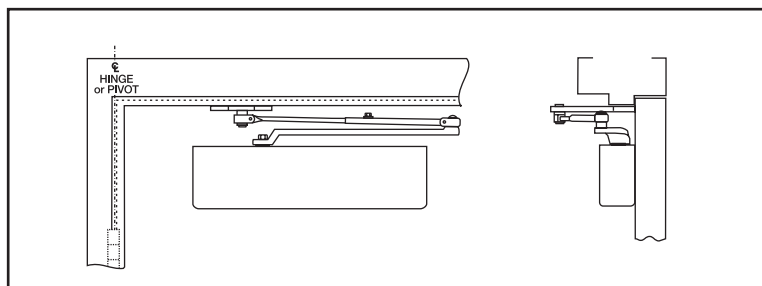
Top Jamb

The closer body is mounted on the frame face above the door, opposite the door's hinge side. The forearm is mounted on the top rail of the door by means of a mounting shoe. The top jamb closer is particularly suitable for doors with a narrow top rail, such as an aluminum-and-glass "storefront" door. Finally, the geometry of the assembly makes a top jamb closer somewhat more power-efficient than a parallel arm closer.



Parallel Arm

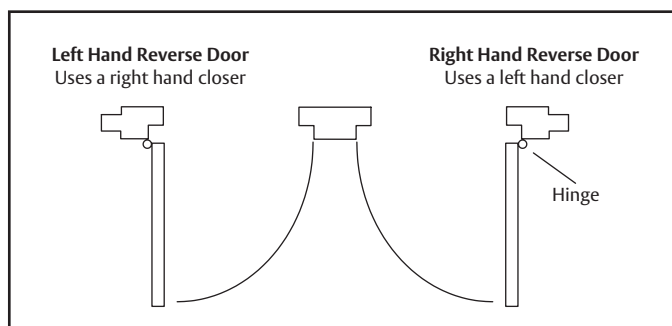
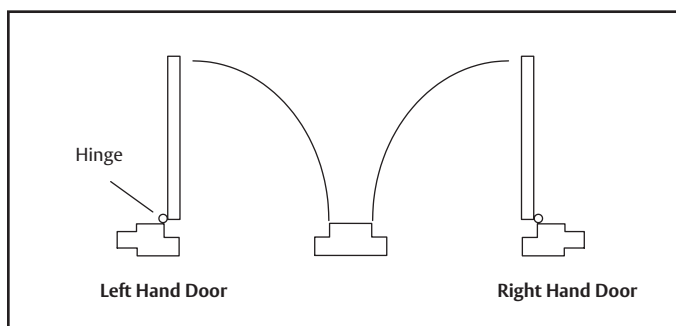
The closer body is mounted on the top rail of the door opposite the hinge side of the door. The forearm is mounted to the underside of the frame (the soffit) by means of a soffit plate, and requires no space on the frame face. The arm is parallel to the door, and therefore less accessible to mischief. The depth of the door's top rail is an important consideration when using this method of mounting. This method of mounting reduces the power-efficiency.



Hand of Door

Many door closers are non-handed. This means they can be placed on a door in such a way that they will operate a left-opening or a right-opening door. Even so, some covers, arms or holding devices are handed. In such a case, the hand of the door should be specified.

The illustrations below show how to determine the hand for door closers and other hardware.



Hardware	Hand of Door Opening Inward	
	Left Hand	Right Hand
Door Closers	LH	RH
RA, PA & TJ	RH	LH
Corner Brackets	LH	RH
Locks	----	----
Panic Exit Devices	----	----

Hardware	Hand of Door Opening Inward	
	Left Hand	Right Hand
Door Closers	RH	LH
RA, PA & TJ	LH	RH
Corner Brackets	LHR	RHR
Locks	LHR	RHR
Panic Exit Devices	LHR	RHR

Door Closer Sizes

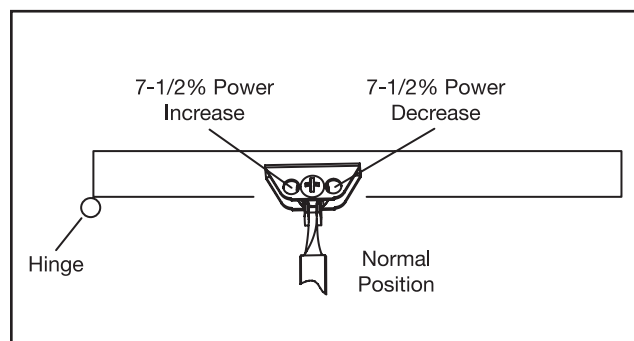
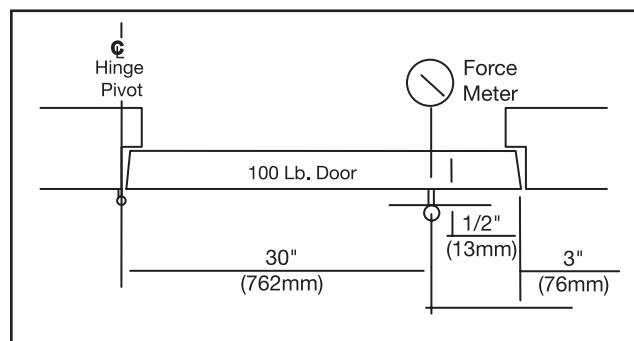
It is important that every manufacturer's door closer is sized and tested on the same basis. An industry standard has been adopted by the American National Standards Institute (A.N.S.I.) for this purpose.

The test is based upon controlling a 100 lb. door which has a center of gravity 18" (457mm) from the centerline of the door's pivot point (hinges). A force meter is located on the door 30" (762mm) from the centerline of the pivot point.

With the door closer installed, the door is opened to a minimum of 3" (76mm) and allowed to close from the power of the door closer. The greatest force exerted by the door closer, as the door closes between 3" (76mm) and 1/2" (13mm), determines the closing force of the door closer.

The following table shows the minimum closing force permitted for each closer size. All Norton® closers meet or exceed these minimum closing force standards.

ANSI/BHMA Door Closer Size	ANSI/BHMA Minimum Closing Force (Pounds)
2	3
3	5
4	8
5	11
6	14



Some series of *Norton* door closers are available with "50% power adjustment." These closers have an easily accessible adjustment that allows the installer to adjust the closing force. These closers allow a 50% increase in the minimum closing force for any given size.

In the case of a size 4 closer with an 8 pound minimum closing force, the closer's minimum closing force could be increased by 50% (1/2) or 4 pounds. The closer would then have a closing force of 12 pounds (8 pounds + 4 pounds)

Other series of *Norton* door closers are available with a "multi-size power adjustment" feature. These closers are equipped with an easily accessible adjustment that allows the installer to adjust closing force through a range of sizes. Traditional style closers are adjustable for sizes 2 through 4 or for sizes 5 and 6. Modern style closers have power ranges that vary, depending upon the door closer series.

Series	Sizes	Power
1601	3 thru 6	A156.4
1601BF	1 thru 4	A117.1 (ADA)
7500	1 thru 6	A117.1 (ADA) & A156.4
8301/8501	1 thru 6	A117.1 (ADA) & A156.4

A third power adjustment available with *Norton* non-hold open regular arm and top jamb mounted closers is the "Adjusta-Power Shoe." Merely by relocation of the closer forearm at the power shoe you can increase or decrease the force at the door's closed position by 7-1/2%.

MEETING A.D.A.
REQUIREMENTS**Meeting A.D.A Requirements**

Note: The following information concerning the Americans With Disabilities Act (A.D.A.) has been extracted from ANSI A117.1 and the Federal Register, Part III, published by the Department of Justice, office of the Attorney General, 28CFR, part 36 and NFPA 101. The information provided here is an interpretation of the requirements which must be met for door opening accessibility by the handicapped or disabled. Please refer to ANSI A117.1 and NFPA 101 for specific details.

Door Opening Width Double-Leaf Doorways

If doorways have two independently operated door leaves, then at least one leaf shall meet the minimum clear opening width criteria. That leaf shall be the active leaf.

Single-Leaf Doorways

Doorways shall have a minimum clear opening of 32" (815mm) with the door open 90 degrees, measured between the face of the door and the opposite stop.

Door Opening Force

The maximum force for pushing or pulling open a door shall be as follows:

1. Fire doors shall have the minimum opening force allowable by the appropriate administrative authority.
2. Other doors: Interior hinged doors: 5lbf (22.2N).

These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.

Fire Doors (NFPA 101)

The forces required to fully open any door manually in a means of egress shall not exceed 15lbf (67N) to release the latch, 30lbf (133N) to set the door in motion, and 15lbf (67N) to open the door to the minimum required width. These forces shall be applied at the latch stile.

Note: The pound forces stated above should be reduced **where possible** to comply with exterior hinged door and interior hinged door requirements. However, door closing capability must not be compromised.

Door Closing Speed

ADA: If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3" (75mm) from the latch, measured to the leading edge of the door.

A117.1: Door closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to an open position of 12 degrees shall be 5 seconds minimum.

Delayed Action

Although the optional delayed action feature is extremely beneficial to the severely handicapped, it is not a requirement of A.D.A.

Door Opening Force

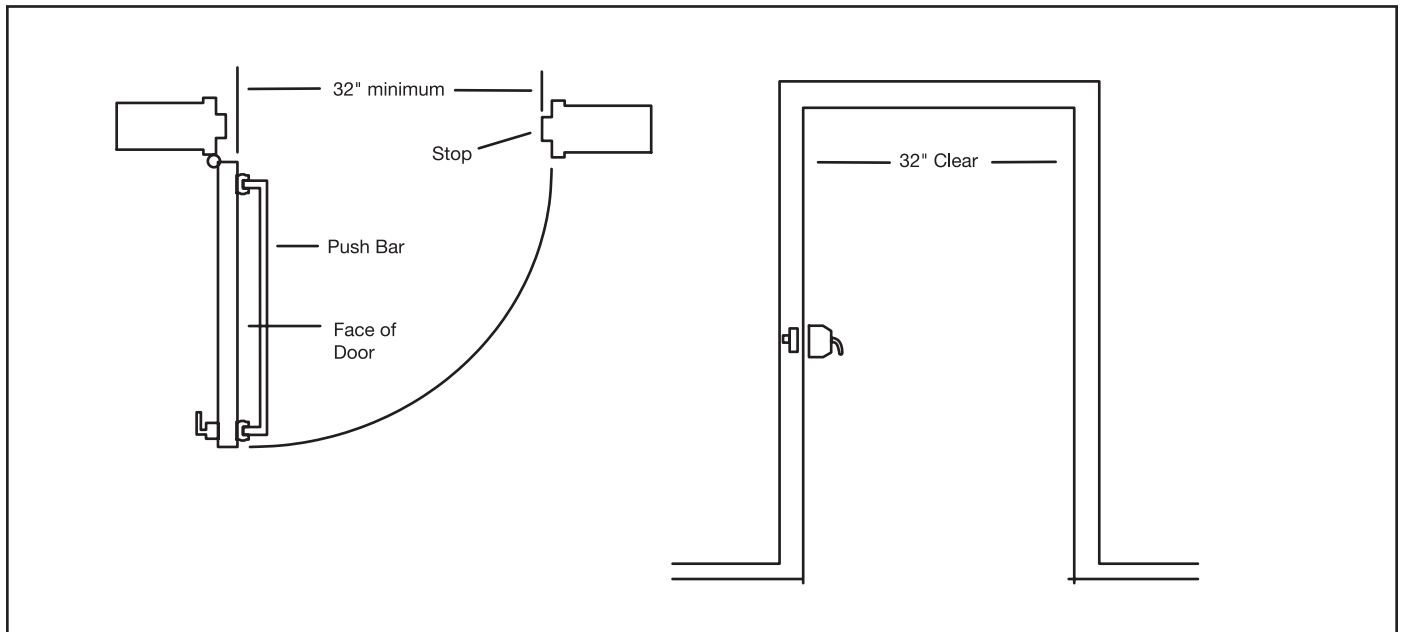
Opening forces may be measured with a spring scale as follows:

1. **Hinged Doors.** Apply force perpendicular to the door at the actuating device (lockset/pull) or 30" (760mm) from the hinged side, whichever is farthest from the hinge.
2. **Application of the Force.** Apply force gradually so that the applied force does not exceed the resistance of the door. Air-pressure differential, especially in high-rise buildings, can have an adverse effect on door-opening force. Accessible openings located in these areas will sometimes require the use of automatic or power-assisted doors to comply with allowable forces given.

Additional force to overcome the inertia of a door will exceed that required to maintain movement of the door. In general, only a momentary auxiliary force should be permitted to exceed the force indicated above.

Hinged Doors

The 32-inch opening is measured from the stop on the door jamb on the latch side and the face of the door when standing open in the 90° position. Push bars and panic type hardware may protrude into this space if they are mounted high enough to allow the wide part of the wheelchair to pass below.





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